



Environmental Protection Department
Hazardous Waste Management Division

**The Chemical Exchange Warehouse at
Lawrence Livermore National Laboratory:
A Project Description and Business Plan**

prepared by

**Linda Souza
and
Charles Patterson**

May 1994

CONTENTS

1.0	Overview	1
2.0	Operations	5
2.1	Facility Description	5
2.2	ES&H Constraints	5
2.3	Acceptance Criteria	7
2.4	Inventory System	9
2.4.1	Database	9
2.4.2	Customer Interface	10
2.5	Operations	10
2.6	Inventory Management	11
3.0	Startup	12
4.0	Marketing	13

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

ATTACHMENTS

- A. CHEW Acceptance Form. (Ref: 1.0, 2.2, 2.3)
- B. CHEW Delivery Form (Ref: 1.0)
- C. Chemical Release Form (Ref: 1.0 and 4.0)
- D. Memorandum from S. Brereton to C. Patterson, C. VanWarmerdam, August 6, 1993. (Ref: 2.2)
- E. Operational Safety Procedure No. 693.1 (Ref: 2.2)
- F. Guidance on Material Compatibility
- G. Sample of Filemaker Pro file (Ref: 2.4.1)
- H. Sample of Microsoft Word Report (Ref: 2.4.1)
- I. Sample of Microsoft Excel Spreadsheet (Ref: 2.4.1)
- J. Flow Into CHEW Inventory (Ref: 2.5)
- K. Flow Out of CHEW Inventory to LLNL User (Ref: 2.5)
- L. Flow Out of CHEW Inventory to Off Site Destination (Ref: 2.5)
- M. Startup Schedule for Facilities and Equipment (Ref: 3.0)
- N. Article from *Newsline* Article, December 14, 1993 (Ref: 4.0)
- O. Article from *Waste Matters*, November, 1993 (Ref: 4.0)

The Chemical Exchange Warehouse at Lawrence Livermore National Laboratory: A Project Description and Business Plan

1.0 OVERVIEW

The Chemical Exchange Warehouse (CHEW) at Lawrence Livermore National Laboratory (LLNL) was developed to store excess usable chemicals and offer these chemicals to other users rather than dispose of them as hazardous waste.

CHEW was established to improve LLNL's waste minimization efforts in a safe and cost effective manner. The Laboratory is organized into many research programs and support functions that independently buy, store, and dispose of a wide range of chemicals. When programs shut down, employees retire, or inventories are reduced, many usable but unused chemicals are sent to Hazardous Waste Management (HWM) for storage and ultimate off site disposal as waste. Such chemicals represent a substantial portion of wastes entering the HWM facility. Management of these materials as hazardous waste is expensive and in many cases unnecessary because many of the materials are commonly needed by another user at LLNL or by external groups.

Prior to the establishment of CHEW, a Lab-wide computerized database for linking the original chemical purchaser with potential users existed at LLNL — the Chemical Exchange Database. This system allowed the original purchaser to list the excess chemicals on a Lab-wide database for a minimum of 60 days and to deal directly with potential users by phone or in person. This system assisted many environmentally conscientious individuals in finding good uses for excess chemicals. It had the significant advantages of being relatively easy to establish and administer as well as of not requiring the expense of setting up a warehouse. However, it had the disadvantage of being time-consuming to use and of not being able to match users with generators in a time frame acceptable to most material custodians, who usually wanted to clean out their inventory within a week. In addition, the Chemical Exchange Database did not address the fact that the majority of excess chemicals need not be used inside the Laboratory but could be used by off site organizations. The CHEW project, then, is an upgrade of or a quality improvement to the existing Chemical Exchange Database.

The HWM Division decided to manage the CHEW project for several reasons. First, it had strong support from the DOE management team as well as from LLNL management. DOE committed \$45,000 from a waste minimization fund to help meet startup costs. Next, HWM already handles chemicals on a Lab-wide basis and has a strong management team capable of directing this effort. It also has a vested interest in minimizing chemical waste since such waste minimization efforts reduce handling, transportation, and disposal costs. HWM estimated that the CHEW project would be no worse than cost/revenue neutral after the startup costs were paid. And last, in keeping with HWM's expanding role in providing "Full Service" to the Lab's waste generators, HWM Field Technicians already managed most of the waste overpacking

campaigns that are required when chemical inventories are reduced. They were thus in position to evaluate the excess chemical products and channel appropriate ones to CHEW.

The concept of an exchange warehouse was discussed within HWM for several months, but in July 1993, HWM management found compelling reasons to start the operations by the end of FY93. The principle concern was the Voluntary Early Retirement Incentive Program (VERIP) III, which would induce 700+ employees to take early retirement on November 1, 1993. Many of these retirees controlled significant quantities of chemicals that would be declared waste without such a program. The second reason for quick startup was the planned Chem. Tracking Project slated for implementation starting in November 1993. Instead of going to the trouble of entering slow-moving chemicals into the Chem. Tracking database, users were expected to declare many of them hazardous waste. The third reason was the expected acceleration in program changes and shifts (including laboratory close-outs) as LLNL changed to non-weapons-related projects.

In order to establish a new chemical warehouse on site, many approvals for safety, environmental protection, and site planning were required. These approvals typically take a year to accomplish, even when the energy level of the requester is high and the justification is good. In addition, there were no known potential locations currently available other than the HWM facilities. Therefore, HWM decided to investigate using part of its own hazardous waste storage unit in Building 693 as the initial warehouse for the exchange program. Building 693 was designed for chemical storage and had sufficient space to accommodate the CHEW project. Building 693 is operated under an Interim Status Agreement with the Department of Toxic Substances Control, the California state agency responsible for controlling hazardous waste storage, and the pending RCRA Part B Permit Application was easily amended to include the storage of chemical products in Building 693.

A primary concern of the Environmental Safety and Health (ES&H) team at the Laboratory was that CHEW storage conform with the Building 693 Safety Analysis Document (SAD) and be within the envelope of the maximum credible accident scenario for Building 693. Based on the ES&H team's recommendation, cabinets with doors were installed as CHEW storage cabinets in Building 693, earthquake restraints were placed across the front of each shelf, and single container limits for acutely hazardous materials are maintained in compliance with the Building 693 SAD.

The Environmental Evaluations Group (EEG) and DOE-OAK also evaluated the activities proposed in relation to NEPA requirements. Both organizations determined that CHEW would be operated within the bounds of routine operations as outlined in the 1992 EIS/EIR for LLNL. Consequently DOE-OAK approved a Guidance Request Response.

HWM projected that approximately 25% of available unused chemicals would be captured under the CHEW program. It is anticipated that 25% of that volume stored in the warehouse would be redistributed within LLNL. The CHEW operation tracks its collection and redistribution volumes to evaluate its own efficiency. Materials that have not been used within LLNL and have exhausted the predetermined storage time in the CHEW are marketed outside

LLNL to the DOE community, other government agencies (that include academic institutions), local material exchange networks, and commercial chemical brokers.

Categories of materials stored within the CHEW include:

- Chemical reagents
- Paints, coatings, and adhesives
- Cleaning compounds
- Oils and solvents.

Materials excluded from CHEW are such items as:

- Unsafe and radioactive chemicals
- Outdated or unusable chemicals
- Unknowns
- Drug precursors
- Water-reactive metals
- Compressed gas cylinders.

The typical movement of chemicals into and out of CHEW is as follows:

Into CHEW:

- Current custodian of the chemical(s) contacts the HWM Field Technician for help with inventory reduction.
- Field Technician reviews excess inventory against CHEW suitability criteria.
- Current custodian and Field Technician fill out CHEW Acceptance Form (see Attachment A) and attach Material Safety Data Sheet (MSDS) for all non-reagent material (i.e., paints, aerosols, adhesives, etc.).
- CHEW Acceptance Form sent to HWM Review Chemist and CHEW Technician for approval.
- CHEW Technician moves chemicals into CHEW stock at Building 693
- CHEW Technician enters item into the CHEW database and files MSDS and CHEW Acceptance Form.

- Each day the CHEW Technician downloads the CHEW database to Microsoft Word and Excel files available on a fileserver for use by potential LLNL users.

Out of CHEW to an LLNL User:

- Potential user identifies a need to procure a chemical.
- Potential user interfaces with CHEW database via one of two avenues:
 - 1) Reviews the CHEW Word or Excel files for availability.
 - 2) Potential user sends chemical requisition to Purchasing. Purchasing checks the CHEW Word file, identifies a potential match, and phones potential user to suggest CHEW.
- Potential user decides to use CHEW inventory and calls CHEW Technician.
- CHEW Technician completes and files CHEW Delivery Form (Attachment B), delivers item with appropriate MSDS, and removes item from database.

Out of CHEW to an Off-Site Destination:

- CHEW database indicates a chemical has reached a storage time review point.
- CHEW Technician places appropriate items on a list for movement off site and completes Chemical Exchange Release form. (see Attachment C)
- List is distributed by Property Management to the DOE community via a nation-wide database .
- Desired items are removed from CHEW database, the CHEW Delivery form is completed, and the material and MSDS are transferred to interested organizations.
- Items not taken by interested organizations will be offered at public auction and the database will be adjusted as noted above.
- Items not sold will be declared hazardous waste and managed appropriately.

NOTE: The LLNL programs will pay for the HWM Field Technician's time used in routing chemicals into CHEW but not for the CHEW Technician's time. The programs normally pay for the HWM Field Technician's time to handle the chemicals as hazardous waste, so they should not notice much difference in their costs because of CHEW.

2.0 OPERATIONS

2.1 Facility Description

The CHEW storage facility is located in Building 693 in the northeast corner of the LLNL site. Building 693 is a hazardous waste storage unit, part of LLNL's Treatment, Storage, and Disposal Facility (TSDF) for hazardous waste. The building is split into four separate cells, each devoted to a separate kind of hazardous waste: ignitables, bases, TSCA (Toxic Substance Control Act) substances, and acids. Each cell has a maximum permitted storage capacity of about 18,600 gallons. The CHEW products storage area is limited to the east end of each cell and has a separate personnel door on the east end that allows customers (only when escorted by the CHEW Tech) to access the CHEW areas without passing through the waste areas. The waste is stored on the western side of each cell and is accessible by means of large roll-up doors as well as personnel doors. Eye washes and safety showers are located in both the east and the west ends of each cell.

Movable fork lift barriers separate the hazardous waste from the CHEW product storage area to prevent accidental fork lift damage to the cabinets where CHEW products are stored. These barriers also serve to discourage CHEW customers from entering the waste areas. Metal cabinets for CHEW products are seismically anchored in each cell for storage of individual containers of CHEW products, which are not packaged in DOT-approved containers as the waste is. Three-inch-tall earthquake barriers slip into the cabinet frames on the front of each shelf and prevent spillage in the event of an earthquake.

A small, prefabricated, free standing office with an air conditioner and electric heat was placed on a concrete pad adjacent to the facility to house the CHEW technician. This office has electrical, phone, and computer lines and a copier, fax machine, and computer with a printer. A desk and filing cabinet were obtained from excess furniture. Bottled water and a portable toilet were already at the site for use by the Waste Storage Technicians assigned to Building 693.

HWM trucks equipped with the proper containers for the separation of incompatibles are used to transport chemicals on site between the programs and Building 693. Wheeled carts are used by the CHEW Technician to transfer small containers between the truck and the cabinets and between the truck and the user's facility, as needed.

2.2 ES&H Constraints

The HWM Facilities and Assessments Section, Sandra Brereton of the SAR (Safety Analysis Reports) and Criticality Group in the Hazards Control Department, and ES&H Team 4 also from the Hazards Control Department evaluated the potential safety and environmental effects of operating the CHEW in Building 693 (see Attachment D). They developed the following restrictions to maintain conformance:

- Non-DOT packaged chemicals (e.g. reagents in glass bottles) must be stored on enclosed shelving that is seismically anchored, with doors and earthquake bars across the front of each shelf.

- All incoming chemicals must be described by a knowledgeable party (e.g. custodian) on paper with signature ("CHEW Acceptance Form"). Material Safety Data Sheets (MSDS's) must accompany all non-reagent material.
- All incoming chemicals must be reviewed and approved with respect to an acceptance criteria (for safety, adequate description, usefulness, etc.) by an HWM Review Chemist before being accepted for CHEW storage.
- The B693 SAD maximum single container limits (IMAX) of Federal Extremely Hazardous Materials, State Acutely Hazardous Substances and other dangerous chemicals apply to DOT packaged products or single stacked lever locked steel containers. These IMAX limits apply as facility limits for the aggregate of chemicals contained within cabinets (i.e. the combined cabinets are viewed as one single container).
- A supplemental list of dangerous chemicals and their limits were calculated and added to the IMAX list and must be used as facility and/or single container limits too.
- Install barriers to minimize accidental fork lift damage to cabinets and subsequent chemical release.
- The facility must be maintained and operated in accordance with all ES&H requirements as specified by the Interim Status Document, the Part B Permit Application, the B693 Safety Analysis Document (SAD), Federal and State regulations, DOE orders, and LLNL and HWM policies and procedures.
- Develop an Operational Safety Procedure (OSP) that addresses the ES&H concerns specific to the CHEW operation. (Attachment E)
- Develop a Standard Operating Procedure by week eight of operations that will provide operational instruction for performing the various activities associated with CHEW.

The California Department of Toxic Substances Control (DTSC) made the following constraints:

- Only HWM personnel may transfer the chemicals in and out of Building 693.
- The chemicals must be stored in a safe and compatible manner.
- The permitted storage capacity of each cell may not be exceeded when adding both waste and CHEW volumes together.

2.3 Acceptance Criteria

Each item or lot of items with exactly the same description must have a CHEW Acceptance Form (see Attachment A) filled out by the custodian or the HWM Field Technician and signed by the custodian or person with sufficient knowledge of the product's history to sign the form. An MSDS for all non-reagent material should accompany the CHEW Acceptance Form and be sent to an HWM Review Chemist. Materials coming from Radioactive Materials Management Areas (RMMAs) will be accepted if the custodian has signed the declaration on the CHEW Acceptance Form. If the custodian cannot certify that the material is non-radioactive, the custodian must obtain a sample of the material and submit that sample for a full radiological analysis as outlined in the guidance provided in the *Criteria and Procedures for the Certification of Nonradioactive Hazardous Waste* (HWM Procedure 569). This form, accompanied by the supporting paperwork, is given to the HWM Review Chemist for approval. The rules for acceptance are basically the same as those for accepting hazardous waste in the Area 612 Facility/Building 693 but with a few additional exclusions.

In general the types of chemicals that are **accepted** for the CHEW inventory are:

- New chemicals
- Opened/partially used chemicals in appropriate, clean containers
- Paints and coatings
- Cleaning compounds
- Adhesives and resins
- Oils and solvents.

Note: All the above must be in original manufacturer's container in good condition.

Items that are **excluded** are:

- Explosives
- Outdated chemicals
- Products with no demand on or off site
- Products with poor or dirty packaging
- Products not certified to be free of radioactivity
- Inoperable spray cans
- Customized mixtures

- Solutions in dispensing/squeeze bottles
- Products in unlabeled containers
- Drug precursors
- Acutely/extremely hazardous chemicals that exceed Building 693 Facility Single Container Limits
- Water-reactive metals
- Compressed gas cylinders (spray cans are acceptable)
- Crystallized liquids
- Any item deemed to be unsafe or inappropriate for CHEW by the HWM Review Chemist, HWM Field Technician, or CHEW Technician.

If the item is unacceptable for the CHEW inventory, the HWM Review Chemist indicates the reason on the CHEW Acceptance Form, does not sign the acceptance form, and returns it to the HWM Field Technician so the chemical can be managed as hazardous waste. If an item is unacceptable for storage in Building 693 but may be in demand on site and if the custodian is willing to keep it, the CHEW Technician may list it in the database, showing the custodian's location. He can then facilitate an exchange directly between a potential user and the custodian.

If the item is acceptable, the HWM Review Chemist determines the HWM compatibility code(s) (Attachment F), attaches the appropriate compatibility sticker(s) on the signed CHEW Acceptance Form (with the MSDS and Swipe Survey when applicable) and sends it to the CHEW Technician.

If the HWM Review Chemist indicates on the CHEW Acceptance Form that the chemical has an IMAX limit (acutely hazardous, etc.), the CHEW Tech checks the current CHEW database to see if the single container limit will be exceeded in the cabinets by the addition of this item (the total cabinet inventory of any IMAX item may not exceed the Single Container Limit). If it will be exceeded, the technician must reject the item or package it in a DOT container or in a steel container with lever lock lid when it arrives at Building 693. (The Single Container Limit may not be exceeded in any one DOT container inside Building 693. Lever locks may not be double stacked in Building 693).

The HWM Field Technician, HWM Review Chemist, or CHEW Tech may reject any item that he/she feels does not meet the criteria stated above or would be unsuitable for CHEW.

2.4 Inventory System

2.4.1 *Database*

The CHEW Technician maintains one master database using Filemaker Pro. The master database is not available to the general Lab population; it is accessible only by the CHEW Technician and certain designated key personnel. In addition to the master database, the technician maintains both a current Microsoft Word and an Excel file by exporting specific fields from the Filemaker Pro database. Each morning he/she inputs the data from the inventory activities completed since the last update into the master database. When that is complete, the technician exports eight specific fields (Chemical Name, ID#, and Quantity) into the Microsoft Word file. This Microsoft Word file is an alphabetical listing by chemical name of the entire CHEW inventory with one short line per item designed for potential customers and the Purchasing Department to use for browsing. Based on customer requests, the fields described in the Microsoft Word file can easily be modified to include more or less information. The CHEW Technician also exports most of the data fields to an Excel file. This file is to be used by customers to find the details concerning potentially useful items they identified in the Microsoft Word file. See Attachments G, H, and I for representative samples of the Filemaker Pro file, the Microsoft Word report, and the Excel spreadsheet.

The file server that contains the master database and the user files has hard disk redundancy to eliminate data loss. The server has Ethernet capability to speed up file transfer times. The database is backed up on a regular schedule. The file server administrator is provided by the Waste Operations Section of HWM.

The Microsoft Word and Excel files are maintained on the HWM Operations server and can be easily accessed with Macintosh computers over Open Labnet. IBM computers can also access the databases if they have the necessary hardware and software.

The Filemaker Pro database features the following:

- All pertinent information concerning the material being entered into the database, including: Chemical name, Purity, Physical State, Quantity, Origin, Unique ID #, and other fields that will aid in the operation of the Chemical Exchange system.
- Fields that will calculate either when the chemical expiration date is approaching or when the allowable time in the warehouse is expiring.
- Easy export from/import to text files.
- Tracking of individual chemicals by noting the final disposition.
- Ability to add new fields if necessary to allow interfacing with other Laboratory programs.
- Comparison of daily container inventory with SAD IMAX limits.

2.4.2 *Customer Interface*

Potential customers who are looking for specific chemicals and are using Macintosh computers with Open Labnet capabilities should follow the guidelines below:

- Drag down "apple" to **Chooser**
- Select **AppleShare**
- Select Zone **EPD T6179**
- Select Server **Operations (click OK)**
- Select Log-On Method **Use the Default Method, if asked (click OK)**
- Select **Guest (click OK)**
- Select by highlighting **HWM-CHEW (click OK)**
- Close Chooser Window.
- Server Icon HWM-CHEW appears on desk top.
- Open the CHEW folder from within the server icon.
- Copy either the Word file or the Excel file into your local hard disk.
- Copy either the Word file or the Excel file to your local hard disk.
- Browse the selected file you have copied for the desired chemical.
- Contact the CHEW Tech by phone for further information and/or to schedule delivery of the desired product.

With the cooperation of Purchasing, potential users who are ordering chemicals can quickly check the current Word file on the server to determine if a requisition can be satisfied by the Chemical Exchange Warehouse.

Access to the CHEW system by other platforms (IBM, Sun, etc.) will be driven by the success of the program and by requests for access from users with those platforms.

2.5 Operations

In general, an HWM Field Technician is called by the custodian of excess hazardous chemicals to give advice and help in closing out a group of chemicals or a large quantity of one chemical by managing it as hazardous waste. The technician's service would normally include separating the usable chemicals from those that have no apparent value for further use at LLNL. The latter items would then be lab packed at the custodian's work area. Before CHEW existed, and as time allowed, the HWM Field Technician would try to find a home for the usable chemicals within the same program or suggest that the custodian list them on the Chemical Exchange Database. If that failed, the items were managed as hazardous waste. Now, the HWM Field Technicians

assist generators in identifying candidate materials to enter into the CHEW (as well as potential users for CHEW inventory items). In addition, they help the custodians fill out the CHEW Acceptance Form and secure an MSDS.

The CHEW Technician manages the inventory, picks up and delivers CHEW items, updates the inventory database, coordinates the marketing effort, and oversees the entire CHEW operation. He/she receives backup from the HWM Field Services Group to cover absences. The CHEW Technician works very closely with the HWM Field Technician to coordinate the management of items coming into CHEW. The CHEW Technician also works closely with the storage facility technicians who manage Building 693 to provide housekeeping assistance and to maintain the two-person rule when handling chemicals.

The CHEW Technician's day is split into two halves. In the morning he/she works at the Building 693 Facility inputting the previous day's activities into the database, answering phone calls from customers, checking inventory, and handling clerical activities. In the afternoon he/she moves inventory from custodians to Building 693 and from Building 693 to customers.

The sequence of operations to both bring chemicals into CHEW as well as to move them into productive use at LLNL or to move them off site is described in Attachments J, K, and L.

Of the unopened containers of CHEW chemicals, a small percentage will not be taken by a new user in a reasonable amount of time because the item is unique or special in some way, has crystallized, or exceeds its shelf life. No open containers can be shipped off site. The plan is to keep all items for a maximum of 1 year. Items remaining in CHEW at the end of 1 year from the time of acceptance into CHEW are managed as hazardous waste.

2.6 Inventory Management

At the first 6-month anniversary of CHEW (4/1/94), a data sort will be prepared of all items in unopened containers in CHEW. From this list the CHEW Technician will identify items desirable for submission to the DOE community database and eventually to off-site marketing. Every effort will be made to prepare these items for public sale and to sell them as soon as possible after the DOE screening cycle ends. In the future this data sort will occur on a quarterly basis (January, April, July, and October).

Beginning with the first annual anniversary (10/94), a separate data sort will be requested on a monthly basis in order to identify items that have been in CHEW for over a year. The CHEW Technician will schedule an inventory reduction crew with the Field Operations Supervisor. They will overpack the items and manage as hazardous waste.

3.0 STARTUP

The CHEW facility activities commenced on October 14, 1993. The principle startup activities were:

- Establish and administer a Steering Committee for overall direction of startup and subcommittees for assignment of startup duties.
- Develop an operating plan.
- Determine ES&H requirements relating to the SAD.
- Install modular office beside Building 693 and hook up utilities.
- Obtain transport vehicle and material carriers.
- Install storage cabinets and work tables.
- Procure computer, printer, fax, copier.
- Procure forklift barriers.
- Develop an inventory database system.
- Develop and approve Operational Safety Procedure (OSP).
- Obtain appropriate NEPA documentation.
- Obtain DOE approval and startup money.
- Develop acceptance criteria.
- Develop a marketing plan.
- Establish a liaison with all the chemical purchasing groups.
- Develop a Standard Operating Procedure (SOP) for CHEW that outlines the general operation as required by DOE/OAK.

Attachment M shows the startup schedule for facility and equipment items.

4.0 MARKETING

The inventory of CHEW chemicals is marketed to LLNL employees in a variety of ways. The first is through the various media at LLNL. This means includes articles and advertisements in *Newsline* (Attachment N), the semi-weekly Lab-wide newspaper, and articles in *Waste Matters* (Attachment O), the HWM quarterly news bulletin. Secondly, the HWM Field Technicians and Environmental Operations Group (EOG) analysts assist the program people in identifying potential users of CHEW materials. Additionally, the EPD Training Group has incorporated information about CHEW into the waste minimization section of the LLNL Hazardous Waste Certification training course.

The CHEW Technician strongly encourages all the chemical Buyers in Stores and Procurement to use the CHEW Database regularly before buying chemicals that might be in the CHEW inventory. The Buyers are encouraged to contact Lab requesters to ask if they are interested in using the chemicals available in CHEW at no charge, including door step delivery within 24 hours, rather than making an outside purchase.

The LLNL Plating Shop and the HWM Tank Farm are large users of acids and bases. The CHEW Technician will contact both of these users when there are slow-moving inventory items that they might be able to use. Most of the acids and bases will be used in this manner, rather than being managed as waste.

We anticipate distributing only 25% of the CHEW inventory to on-site users. A routine inventory will be taken of CHEW at monthly intervals. One purpose of the inventory is to establish a list of chemicals in sealed, unused containers that are not moving on-site. If an item is in an unopened container and has been in the CHEW system for 6 months, the following steps are taken as appropriate:

- The CHEW Technician completes a Chemical Release form (Attachment C) for each item or "lot" of items.
- The CHEW Technician submits the Chemical Release form(s) to LLNL's Property Management's Donation, Utilization, and Sales (DUS) Group for listing on the Federal Property Excess System (database).
- The length of time the chemical is listed on the database is dependent on the estimated value.
- When a chemical is desired by a new user, the DUS group notifies HWM Field Services of the need.
- The CHEW Technician notifies Supply and Distribution's Shipping Office, coordinates the removal of the items (with MSDSs) through the Shipping Office, and updates the database to reflect that the material has been removed from the CHEW inventory.

- If the new user is unable to arrange for shipping, HWM must supply an account number to the Shipping Office to charge for packaging and transportation services.

Starting on July 6, 1994, and continuing semi-annually, the CHEW Technician sorts through the database, searches for those items that are maintained with the custodian, and contacts the custodian to make sure he/she still has the material. If the custodian no longer has the material, the CHEW Technician removes the item from CHEW inventory.

When an item has been in CHEW for over 11 months, the CHEW Technician will prepare to manage the items as hazardous waste. The technician will prepare a Hazardous Waste Disposal Requisition for the material and submit it for approval. The items are to remain in the CHEW storage area until the Hazardous Waste Disposal Requisition is approved. While the requisition is in the approval process, the item is still available for reuse. When the requisition is approved, the CHEW Technician, with the assistance of the HWM Field Tech Technical Services Supervisor schedule an inventory reduction crew to overpack the items. The overpacked items are then moved to the waste end of Building 693 and are managed as hazardous or non-hazardous waste.

Attachment A

CHEW # CH

Field Tæh

Chem Track # CT

CHEW ACCEPTANCE FORM

- 1 Chemical/Product _____
- 2 CAS # _____
- 3 Manufacturer _____
- 4 Expiration date _____
dd/mm/yy
- 5 Purity _____
- 6 Physical State ____ solid ____ liquid ____ powder
- 7 Quantity per item _____
amount unit
- 8 Total Items _____
- 9 Product Container ____ glass ____ metal ____ plastic ____ fiber
- 10 Container Size _____
- 11 Container opened. ____ y ____ n
- 12 Source Information: Bldg # _____ Room # _____ Directorate _____
- 13 Has material been in an RMMA area? ____ yes - go to back of page ____ no - sign below
- Custodian Name _____ Phone/Pager _____

Custodian Signature

Date _____

Attach swipe/survey results and MSDS information if applicable

HWM CHEMIST USE ONLY

Hazardous Properties: ☐ Reactive ☐ Ignitable ☐ Corrosive acid ☐ Corrosive base ☐ Toxic

Compatibility Code:

Imax Chem. ____yes ____no

Imax _____ Qty _____ units

This package meets our criteria for single container limits. It may not meet single container limits for all packages of like materials in storage.

Chemist Signature _____

Date _____

Item Acceptable for Storage

Chemical Exchange Technician

Date _____

Location

Attachment A (continued)

For RMMA Materials

Does the material contain radioactive components? ____ yes ____ no

Was the material kept isolated from any operation that could have produced radioactive contamination using a glove box, vent hood, etc.?
(if no, full rad analysis required) ____ yes ____ no

Was the material exposed to particle beams capable of inducing radioactivity by activation? (if yes, full rad analysis required) ____ yes ____ no

Describe other controls used to prevent radioactive contamination:

I certify, to the best of my knowledge, that the information provided on this evaluation is correct. I understand that I may be liable to State and Federal prosecution by intentionally providing false information.

Custodian Name _____ Phone/Pager _____

Custodian Signature

Date

Attachment B

CHEW DELIVERY FORM

CHEMICAL WANTED _____

SIZE _____

AMOUNT _____

CHEW # _____ CHEM TRACK # _____

REQUESTER OF CHEMICAL _____

PHONE # _____ BEEPER # _____

DATE CALL TAKEN _____

DELIVERY LOCATION

BLDG _____

ROOM _____

DATE _____

TIME _____

DATE DELIVERED _____

FIELD TECH _____

CHEMICAL REMOVED FROM ACTIVE INVENTORY: **YES** ☐ **NO** ☐

CHEW TECH _____

DATE _____

Attachment C

CHEW No.:	<h2 style="margin: 0;">Chemical/Product Release</h2>		
BOX 1 To be completed by the Custodian of the chemical/product			
Number of Containers	Size/Type of Container	Total Volume of Chemical/Product (Amount)	Chemical/Product Name (Unit of Measurement)
Manufacturer	Acquisition Value	CHEW Receipt Date	Expiration date (if applicable)
Location of Chemical/Product: Building: _____ Room #/Cabinet #: _____			
General Usage of Chemical/Product: _____			
<div style="border: 2px solid black; padding: 10px; transform: rotate(-15deg); display: inline-block;"> <p style="margin: 0;">Example Only Use Current Revision</p> </div>			
Chemical/Product is DOT Packaged: <input type="checkbox"/> Yes <input type="checkbox"/> No If no, provide packaging account #: _____			
<div style="display: flex; justify-content: space-between;"> <div> <p>Yes No N/A</p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> </div> <div> <p>Chemical/Product has been analyzed.</p> <p>Exterior swipes of the chemical/product have been taken and analyzed by appropriate ES&H Team member(s).</p> <p>MSDS(s) are attached for all chemicals/products. (REQUIRED)</p> </div> </div>			
I certify, to the best of my knowledge, the information provided on this release form is correct and the chemical/product may be excessed.			
Custodian Name (print)		Employee #	Ext.
Custodian Signature		Date	
BOX 2 To be completed by the Environmental Protection Department (EPD) Field Technical Support Supervisor			
This chemical/product is releasable to DUS (Donation, Utilization, and Sales Group) for the property excess process, excluding K-12 donations:			
<input type="checkbox"/> without restrictions <input type="checkbox"/> with the following restrictions: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>			
Field Technical Support Supervisor, EPD _____ / _____ / _____ <div style="display: flex; justify-content: space-between; font-size: small;"> Print Name Signature Date </div>			
To be completed by Excess Turn-in Center personnel		E-Tag:	
Comments		Condition code:	
Received by		Date Received	
<div style="display: flex; justify-content: space-between; font-size: small;"> Distribution: Original: DUS Copy: CHEW file Copy: CHEW (attached to MSDS) Attachments: Material Safety Data Sheet(s) Chem./Product Rel. 3/94 </div>			

Attachment D*

Memorandum from S. Brereton to C. Patterson, C. VanWarmerdam, August 6, 1993

Interdepartmental letterhead

Mail Station L-631

Ext: 2-4671

August 6, 1993.
SARA93-91

TO: Charlie Patterson, L-620
Charlotte VanWarmerdam, L-546

FROM: Sandra Brereton

SUBJECT: Inventory Limits and Storage Restrictions for the
Chemical Exchange Program in Building 693

I was asked to review the current, approved Safety Analysis Document (SAD) for Building 693 (UCRL-ID-109144) to evaluate whether or not storage of chemicals for the Chemical Exchange Program would violate the safety envelope as defined in the SAD. I have done so, and in this memo I document my comments and recommendations on the subject.

In the Building 693 SAD, inventory limits were derived for certain chemicals for several release scenario types. The limits were back calculated from a concentration of ERPG-2¹ (or its equivalent) at a distance of 100 m from the facility, assuming meteorological conditions of F atmospheric stability and 1 m/s wind speed. A spill, a fire, and a pressurized release were examined. I discuss each of the scenarios below, and describe any differences that may arise for the Chemical Exchange Program.

Chemical spills were assumed to result from the degradation of a drum allowing the contents to spill onto the floor, or from a forklift puncture during handling. Single container limits were derived, as opposed to a facility limit, because: (1) it was assumed to be incredible that more than one drum would degrade and fail at the same time, and (2) although the forklift puncture event could result in adjacent drums falling over, only the drum that is pierced would release its contents because the drums meet DOT specifications, which requires them to maintain their integrity if they fall through less than 4 ft. The assumption here is that drums are stacked no more than two high. An earthquake is not specifically

* The tables and attachments referred to in this memo have not been included for the sake of brevity.

¹ ERPG-2: Emergency Response Planning Guide, Level 2, as defined by the American Industrial Hygiene Association, is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.

Attachment D (continued)

examined because such an event may cause drums to topple over, but since none would be higher than 4 ft off the ground, none would be expected to fail. Thus, the worst spill in the Building 693 SAD would involve only the contents of a single drum. Maximum inventories that would result in a concentration less than the ERPG-2 (or equivalent) value at 100 m were determined on the basis of evaporation of a selected number of extremely hazardous chemicals. These inventories form part of Table D-4 in Appendix D.

If a spill scenario is examined in the context of the Chemical Exchange Program, a couple of differences become apparent. It is planned to store the inventory on shelves in chemical storage cabinets, and not in DOT drums. An accident involving a careless forklift driver could affect more than one container (i.e. many containers in the cabinet), as these would not necessarily meet DOT specifications. Further, an earthquake could cause multiple containers in multiple cabinets to fall over and break open. For these reasons, the individual container limits would not be appropriate. However, if the limits in Table D-4 were applied as a total limit to the chemicals on the shelves of all cabinets, then the envelope of the SAD would be maintained. In other words, all of the cabinets can be viewed as another "drum". And, it would be possible to have multiple containers of the same chemical in the storage cabinet(s), as long as the total of their inventories did not exceed the limit given in Table D-4.

In some cases, the Table D-4 inventory limit is quite stringent, and it would be desirable to have more of a particular chemical on hand. If excess quantities of the same chemical arrive at the facility, storage would be possible if the excess was packaged similar to the waste. The storage drum need not always be a DOT container, as long as some protective packaging were provided. However, if these containers with excess inventory are stacked, a DOT container would be needed. For the excess inventory, the limits in Table D-4 would apply as single drum limits, i.e. the excess chemicals can be handled like the waste. I interpret the SAD as meaning that different, but compatible chemicals can be placed in the same drum, as long as the individual inventory limits are not exceeded for the drum. It would be prudent, however, not to pack chemicals on the EHS and AHM lists together, if at all possible. Similarly, it would be prudent to spread out materials on the EHS and AHM lists among cabinets, to the extent practical.

A fire scenario was also examined in the Building 693 SAD. A container inventory limit was derived for a fire and this was compared to that derived for the spill. The lower of the two is the limit appearing in Table D-4. The fire scenario assumes that 4 drums are involved. This is based on the assumption that 4 drums would be on a pallet, and it is the pallet that is on fire, providing the energy for release. It is assumed that all 4 drums contain an inventory of the same chemical (a low probability occurrence for the waste drums, but maybe not for excess chemicals from the Chemical Exchange Program). This assumption reduces the maximum inventory per drum to one-fourth of the total that is released in the fire. The assumption that 4 containers are involved in a fire would not really apply to the material on the chemical storage shelves. Any number of containers of a given chemical in the flammable storage area could be involved in a fire after falling off the shelf, and it is the total that could be released that is of interest. This should be equivalent to that contained in 4 drums in the fire analyzed in the SAD. Table D-4 does not distinguish as to which release mechanism results in the limiting inventory (i.e. spill or fire). Thus, an adjustment to the fire-based limits in Table D-4 for the flammable chemicals in the storage cabinets is not possible, but their use would be conservative from a safety standpoint. It could be argued that chemicals falling off the shelves in the non-flammable areas would not be subject to a fire at all, and this is the position I recommend here.

The third type of release examined in the Building 693 SAD is a pressurized release from a cylinder. There should be no difference between any cylinder received by the Chemical Exchange Program and those which could be received at Building 693 as waste. Thus, the inventory limits specified in the Building 693

Attachment D (continued)

SAD for non-DOT cylinders containing pressurized gases or liquids would apply equally to the Chemical Exchange Program.

Given all of the above discussion, I summarize recommendations below, which will enable the Chemical Exchange Program to remain within the bounds of the Building 693 SAD:

- o The total inventory of individual chemicals on shelves/in cabinets in the Chemical Exchange areas of B693 shall not exceed the individual limits specified in Table D-4 of Appendix D of the SAD i.e. derived single drum limits will apply as a total to the inventory of a given chemical in all cabinets.
- o Additional storage of excess chemicals in the Chemical Exchange areas of B693 shall adhere to the single drum limits in Table D-4 of Appendix D, and such additional storage will require protective packaging. DOT containers are required if they are to be stacked.
- o For materials not listed in Table D-4, a waste acceptance chemist shall verify if the material is on the EPA list of Extremely Hazardous Substances (EHS), or on the list of Acutely Hazardous Materials (AHM) from the California Department of Emergency Services (see Attachments 1 and 2). If the material is on either list, then a calculation must be performed to determine an inventory limit as follows:

(1) Spill:

The following assumes that the evaporation occurs within one hour:

$$I_{\max}^S = 0.12 \cdot \text{ERPG-2}$$

where:

I_{\max}^S maximum allowed inventory on the basis of a spill (kg)
ERPG-2 Emergency Response Planning Guide, Level 2, or its equivalent,
 for the chemical of interest (see attached Table 1 list of chemicals
 with established ERPG's and Table 2 for hierarchy of alternatives
 when no ERPG-2 is available) (mg/m³)

This would be consistent with the definition of the ERPG's, which are one hour exposure limits. However, this simplified formula does not appear in the SAD.

To determine a limit consistent with the method of Appendix D of the SAD, knowledge of material properties is required. This information may not always be readily available. Despite this, I've included a second formula for determining an inventory limit, which can be used if material properties are known.

$$I_{\max}^S = 980 \cdot \frac{\text{ERPG-2} \cdot \text{SG}}{\text{MW}^{0.667} \cdot \text{VP}}$$

where:

SG specific gravity
MW molecular weight (g/gmole)
VP vapor pressure at 38 °C (mm Hg)

Attachment D (continued)

The limit determined here would apply to the total of a given chemical in all storage cabinets, or to the total excess of a chemical stored in a single packed drum.

(2a) Fire (flammables stored on cabinet shelves):

$$I_{\max}^f_{\text{cab}} = 3 \cdot \frac{\text{ERPG-2}}{\text{RF}}$$

where:

$I_{\max}^f_{\text{cab}}$ maximum allowed inventory of flammable material in cabinets on the basis of a fire (kg)
RF release fraction during a fire (see attached Table 3 for release fractions used in the Building 693 SAD analysis)

(2b) Fire (excess chemicals (flammables and non-flammables) not in cabinets):

$$I_{\max}^f_{\text{stor}} = 0.75 \cdot \frac{\text{ERPG-2}}{\text{RF}}$$

where:

$I_{\max}^f_{\text{stor}}$ maximum allowed excess inventory per container in storage on the basis of a fire (kg)

This latter expression allows the excess material to be treated in a similar way to the waste i.e. the drums may be grouped together in fours and placed on a pallet. This is consistent with the approach of the SAD, where pallets are assumed to be flammable (i.e. wooden), and it is the burning pallet that provides the energy for release in the fire scenario.

The lower of the spill or the fire inventory is that which should apply to chemicals not listed in Table D-4, but included on the EHS or AHM lists. As these sorts of calculations are performed, an expanded version of Table D-4 can be created, and repeat calculations for the same chemical will not be necessary.

(3) Pressurized Release (from non-DOT cylinders):

$$I_{\max}^P = 6.7 \times 10^{-3} \cdot \frac{\text{ERPG-2}}{\text{RF}}$$

where:

I_{\max}^P maximum allowed inventory of material in non-DOT cylinder under pressure (kg)
RF release fraction, for pressurized gases use 1.0, for pressurized liquids use 0.1

Details of the pressurized release calculations are not provided in the SAD. For the above formulation, I have assumed a 3 minute release from the pressurized cylinder. I think this is reasonable, yet conservative.

For non-DOT cylinders, the pressurized release limit would apply as the acceptance limit. This value would bound slower releases that may occur as a result of a slow leak or fire involving

Attachment D (continued)

such containers. For DOT cylinders, a spill and a fire limit should be calculated and the lowest should be applied as an acceptance limit.

For chemicals not on any of the lists, acceptance is at the discretion of the waste acceptance chemist. I summarize the overall acceptance process in Figure 1. If concerns arise, an industrial hygienist can be consulted, or the Criticality and Safety Analysis Group can be contacted to help in making a judgment.

I hope these recommendations enable you to successfully implement the Chemical Exchange Program. If I can provide further assistance, please contact me.

cc C. Barnett, w/o att., L-390
 SARA Files, w/o att., L-390
 HWM chemists, w att.

Attachment E
Operational Safety Procedure No. 693.1
CHEMICAL EXCHANGE WAREHOUSE (CHEW)

1.0 Reason For Issue

The Building 612 Facility Safety Procedure does not cover this operation in Building 693.

2.0 Work To Be Done And Location Of The Activity

2.1 The Chemical Exchange Warehouse (CHEW) is a project designed to identify and temporarily store excess, usable chemicals for use by others who desire these materials.

Categories of materials expected to be stored within CHEW include:

- Chemical reagents
- Oils and Solvents
- Paints and Coatings
- Cleaning Compounds
- Adhesives and resins

This Facility (B693) is currently a storage unit of LLNL's Treatment, Storage and Disposal Facility (TSDF) for hazardous waste. The Building 693 is divided into four separate cells which were designed to separate waste according to chemical compatibility. Cell 1000 is designed to store ignitable waste. Hazardous waste will be stored on the west side of the four cells and the CHEW product storage area will be on the east side of each cell. Chemicals will be transported to new users from the warehouse by HWM field technicians.

3.0 Responsibilities

3.1 Charlie Patterson, Ext. 3-8329 is responsible for the safety of this operation and for assuring that all work is performed in conformance with this OSP, the FSP, and applicable sections in the *Health & Safety Manual* and *Environmental Protection Handbook*. In the absence of the responsible individual, Jim Judge, Ext. 2-0267 shall assume these responsibilities.

3.2 Any changes in operations that improve or do not significantly affect safety and environmental controls may be approved by the authorizing individual for this OSP and the

Attachment E (continued)

ES&H Team Leader. The responsible individual will ensure that this action is documented in a memorandum. Any changes in operations that increase the hazard level, introduce additional hazards, or decrease safety shall not be made until a revision of or supplement to this OSP has been reviewed and approved consistent with the review and approval process for the original OSP.

3.3 Before starting operation, the responsible individual shall verify and document that the operating personnel have read and understand the OSP and applicable sections of the FSP.

4.0 Hazards Analysis

4.1 The potential for chemical releases exists. The Safety Analysis Document for B-693 establishes a spill or small fire as the worst-case chemical (hazardous waste) release mechanism; such a scenario is also expected to hold for CHEW Program materials. Spills occurring during an earthquake are also of concern.

4.2 Potential personnel radiation exposure from chemicals removed from RMMA locations.

4.3 Potential muscle strain/back injury from moving of containers and possible foot damage from dropped containers.

5.0 Controls

The controls specified below will reduce risk to employees and the environment to acceptable levels.

5.1 The following elements will collectively serve to control the risk and severity of a chemical release from CHEW materials stored in B-693:

5.1.1 The following types of materials are categorically excluded from the CHEW Program:

- explosives and unstable chemicals
- outdated chemicals
- products with actual or potential radioactive contamination
- products with poor or damaged packaging
- known unsalable products
- products that cannot be identified
- water reactive metals
- customized mixtures

Attachment E (continued)

- 5.1.2 Chemicals will be transported to and from the CHEW warehouse in a HWM vehicle fitted with a pickup truck mounted container with four separate compatibility sections. The HWM Technician will use a hand-carry segregated container to carry materials which will be transported to and from buildings on a movable cart.
- 5.1.3 To ensure that excluded materials do not enter the CHEW, prospective materials will be inspected by a HWM field technician, and a CHEW Acceptance form, completed by the material's "owner" will be reviewed and approved by an HWM chemist. Materials will not be transported to the CHEW until inspection is performed and the HWM Chemist's approval is obtained.
- 5.1.4 To limit the worst-case chemical release/accident scenario, maximum single container quantity limits (IMAX's) for high-hazard chemicals were established for waste stored in B-693. Single-container quantities of materials taken into the CHEW Program and warehoused in B-693, will also be limited in accordance with these IMAX's.
- 5.1.5 With the exception of the items listed below, materials will be stored in DOT specification containers.
 - 5.1.5.1 "Lever-locked" lids may be used as an alternative to crimp-seal lids or conventional lids with bolt equipped bands, but they may not be double stacked.
 - 5.1.5.2 Materials can be stored in non-DOT specification packaging on enclosed shelving, if the total quantity in all shelf units does not exceed any IMAX's. Shelving units used will be equipped with doors and "earthquake bars" (retainers) for each shelf, and will be seismically anchored.
- 5.1.6 (Movable) barriers will be installed between the CHEW materials storage areas and the waste storage areas to prevent fork-lift damage.
- 5.1.7 No product containers will be opened in B693, and any transfer of material from a product container will be done in the field at the users location by the user. However, packaging into DOT and lever-locked containers will be allowed in B693. Movement of any material within the facility will require the "Two-man rule" (Buddy system).

Attachment E (continued)

5.1.8 In the event of a spill of CHEW materials at the B-693 Facility, response procedures established for hazardous waste spills outlined in the B-693 Contingency Plan will be used. Each end of the cells has an emergency exit which will always remain accessible.

5.1.9 Facility access controls as stated in the Building 612 Facility Safety Procedure will be followed for CHEW project clients and visitors who visit this facility.

5.2 Radioactive materials will not be accepted for the chemical exchange program. Materials coming from RMMA's will be accepted if the custodian has signed the declaration on the Chew Acceptance Form. Any suspect materials coming from RMMA locations will be surveyed for radioactive contamination by a Hazards Control Health and Safety Technologist, under the direction of the area Health Physicist. The survey and swipe data will be attached to the completed CHEW Acceptance form. This form, accompanied by the supporting paperwork, is given to the HWM Review Chemist for approval for acceptance.

5.3 Chemical containers of 5 gallons or larger will be stored on pallets instead of on shelves in cabinets. HWM Technicians will follow the controls outlined in the FSP for Area 612/B693 to prevent foot and back injuries while working at CHEW.

6.0 Environmental Concerns and Controls

6.1 In the event of a spill of CHEW materials at the B693 facility, the incident will be handled in accordance with the B693 Contingency Plan. All spilled chemicals immediately become hazardous wastes and will be handled, packaged, stored and disposed of as such .

6.2 The B693 Safety Analysis Document (SAD) specified maximum single container quantity limits (IMAX) for certain Federal Acutely Hazardous Materials, State Extremely Hazardous Materials, and certain other dangerous chemicals. The maximum single container quantity limits will be applied:

- to the total quantity of the specific chemical stored in all the cabinets, combined.
- to the total quantity of the specific chemical stored in a DOT approved container.
- to the total quantity of the specific chemical stored in a single stacked steel container (e.g., containers with lever-locked lids)

Attachment E (continued)

A supplemental list of dangerous chemicals and their limits was added to the IMAX list, and will be used in the same manner.

6.3 The total volume of hazardous waste and CHEW product chemicals stored will not exceed the permitted storage capacity of the cell.

6.4 CHEW chemicals will be stored in B693 according to the waste storage chart specified in the Part B Permit Application for B693. This storage chart specifies the types of materials that can be stored in each cell to prevent incompatible chemicals from being stored together.

6.5 Chemicals which exhibit the hazardous property of ignitability will be stored exclusively in Cell 1000.

6.6 Non-DOT approved containers stored on pallets will not be double stacked.

7.0 Training

7.1 HWM Field Technicians performing chemical transfer operations at CHEW must complete the following training prior to being allowed to perform these operations unsupervised. The frequency for these courses are in parentheses.

HS0001	New Employee Safety Orientation	(Once)
HS1620	Standard First Aid	(3 years)
HS1670	Fire Extinguishers	(1 year)
HS5610	Fork Truck Certification	(5 years)
HS5620	Fork Truck Safety	(5 years)
EP0039-001	SARA/OSHA (24 hour)	(1 year)
EP0045	SARA/OSHA Field Experience	(Once)
EP1100	Hazard Communication:HWM Facilities	(Once)
EP5003	RCRA Personnel Training	(1 year)
EP5120-022	Building 693 Container Storage Unit	(Once)

Attachment E (continued)

7.2 The HWM Field Technician Supervisor shall complete the following training. The frequency for these courses are in parentheses.

HS0001	New Employee Safety Orientation	(Once)
HS1620	Standard First Aid	(3 years)
HS1670	Fire Extinguishers	(1 year)
HS4050	Health Hazard Communication for Supervisors	(Once)
EP0039-001	SARA/OSHA (24 hour)	(1 year)
EP0041	SARA/OSHA Supervisory Training	(Once)
EP5003	RCRA Personnel Training	(1 year)

7.3 The responsible individual shall ensure that all required training, including on-the-job training if applicable, is complete and documented.

8.0 Maintenance

8.1 The maintenance of safety systems and/or equipment associated with Building 693, important to the protection of safety and the environment, are identified in Appendix G of the Building 612 Complex FSP and in the Building 693 Contingency Plan.

9.0 Quality Assurance

9.1 This facility will be maintained and operated in accordance with all ES&H requirements as specified by the Interim Status Document, the Part B Permit Application, the B693 Safety Analysis Document (SAD), Federal and State regulations, DOE orders, and LLNL and HWM policies and procedures.

10.0 Emergency Response Procedures

10.1 The emergency procedures outlined in the Building 693 Facility Contingency Plan (April 1993) will be followed.

Attachment E (continued)

11.0 References

11.1 Building 693 Facility Contingency Plan (April 1993)

11.2 Facility Safety Procedures, Radioactive and Hazardous Waste Treatment and Storage Facilities: The 612 Complex and Building 693

11.3 Chemical Exchange Warehouse Business Plan (DRAFT) (October, 1993)

11.4 Health and Safety Manual

11.5 Environmental Protection Handbook

11.6 Memo from Sandra Brereton titled "Inventory Limits and Storage Restrictions for the Chemical Exchange Program in B693" Dated 8/6/93

Attachment E (continued)

12.0 Review and Approval

This OSP was reviewed by:

Responsible Individual
Waste Operations Section Leader
C.E. Patterson

Hazards Control:
Dale Hawkins
ES&H Team 4 Leader

Facility Supervisor
Wendell Kelley

This OSP is approved by:

HWM Division Leader
Keith Gilbert

Attachment E (continued)

Distribution

Gensheer, Frank	L-692
Hawkins, Dale	L-692

Controlled Distribution:

Keith Gilbert	L-621
R. Crawford	L-621
C. Patterson	L-620
J. Judge	L-620
W. Kelley	L-620
J. Tonowski	L-620
R. Hollister	L-620
B. Nisbet	L-546
R. Kochhar	L-546
L.Souza	L-620

Attachment F

Guidance on Material Compatibility

When transporting material to Building 693 and storing material within CHEW, assure material compatibility by storing the material using the following compatibility matrix:

NOTE

Additional chemical compatibility guidance for storing and handling the material may be obtained through the HWM Environmental Chemist.

Compatibility Matrix

	CA	CB	OX	IL	AQ	W/AR	RC	DS	NAL
CA		✗				✗	✗		
CB	✗					✗			
OX				✗					✗
IL			✗			✗	✗		
AQ						✗			
W/AR	✗	✗		✗	✗		✗		✗
RC	✗			✗		✗			
DS									
NAL			✗			✗			

✗ = NON COMPATIBLE

<u>Code</u>	<u>Description</u>
CA	Corrosive Acid
CB	Corrosive Base
OX	Oxidizer
IL	Ignitable Liquid
AQ	Aqueous
W/AR	Water/Air Reactive
RC	Reactive Constituents
DS	Dry Solids
NAL	Non Aqueous Liquid

Attachment G

SAMPLE OF FILEMAKER PRO FILE

HWM CHEW

CHEW ID #	CHEW ID #	DATE IN	DATE IN
Chemical_ID	Chemical_ID		
Chemical Name	Chemical Name		
CAS #	CAS #		
Mfgr Name	Mfgr Name		
Expiration Date	Expiration Date		
Purity	Purity		
Physical State	Physical State		
Quantity_amt	Quantity_amt	Quantity_unit	Quantity_unit
Quantity_total items	Quantity_total items		
Container type	CONTAINER		
Container Size	Container Size		
Opened?	Opened?		
Bldg	Bldg		
Room	Room		
Directorate	Directorate		
RMMA area	RMMA area		
Custodian Name	Custodian Name	Phone/Pager	Phone/Pager
Haz Properties	Haz Properties		
Compatability Code	Compatability Code		
Imax ?	Imax Qty	IMAX QTY	Imax Units
Whse Location	Whse Location		
Dispensing	Dispensing		
Disposition	Disposition		
Disposition Date	Disposition Date		
Notes	Notes		

HWM Chemical Exchange
Warehouse

Attachment H
Sample Microsoft Word Report

CHEMICALS AVAILABLE	CHEW#	CAS#	PURITY	WT.	UNIT	TOTAL	OPENED
1-BUTANOL	000089	71-36-3	REAGENT	500	ML	1	1Y
1-BUTANOL	001591	71-36-3	REAGENT	250	ML	1	YES
1-BUTANOL	001751	71-36-3	REAGENT	100	ML	1	YES
1-METHYLIMIDAZOLE	001909		REAGENT	300	ML	1	YES
1-OCTADECANOL	001025		REAGENT	1	KG	1	YES
1,10-PHENANTHROLINE	000133	66-71-7	REAGENT	250	GM	1	NO
1,2-NAPHTHOQUINONE-4-SULFONIC SODIUM SALT	000185	521-24-4	REAGENT	250	GM	1	YES
1,3-DIPHENYL-1,3-PROPANEDOINE	000107	120-46-7	TECHICAL	250	GM	1	YES
1,5-DIPHENYL-CARBOHYRAZIDE	000106	140-22-7	TECHICAL	250	GM	1	YES
2-7-DICHLOROFLUORESCIN	000105	76054-0	TECHICAL	250	GM	1	YES
2-BUTOXYETHANOL	000924	111-76-2	PRACTICAL	3.5	LT	1	YES
2-ETHOXYETHANOL	001522		DISTILLED	1	GL	2	YES
2-FURALDEHYDE (FURFUROL)	001827	98-01-0	UNUSED	1	LT	1	YES
2-HEPTANONE	001781	110-43-0	REAGENT	4	LT	1	YES
2-METHOXYETHANOL	000904	109-86-4	PURE	4	LT	1	NO
2-METHYL-2,4-PENTANE-DIOL (HEXYLENE GLYCOL)	001753		UNUSED	4	LT	1	YES
2-NAPHTHOL	000115	135-19-3	PURE	250	GM	1	YES
2,3-NAPHTHALENEDIAMINE	000114	771-97-1	REAGENT	250	GM	1	YES
2,4-DIMETHYL-3-PENTANE (ISOPROPYL KETONE)	001773	565-80-0	98%	3	KG	4	3Y&1N
2,6-DIMETHYL-4HEPTANONE	000753		PURIFIED	1	KG	2	YES
3-HEPTANONE (BUTYL ETHYL KETONE)	001771	106-35-4	PRACTICAL	1	LT	1	YES
3,3-THIOPROPIONIC ACID	001026		REAGENT	1	GM	1	NO
718 MICROMHO STANDARD SOL KCL IN 99.9% H2O	001984		PURE	500	ML	1	NO
ACACIA (GUM ARABIC)	000097		UNUSED	1	GM	1	NO
ACETIC ACID, GLACIAL	002041	64-19-7	REAGENT	1.5	LT	2	YES
ACETIC ACID, GLACIAL	000345		REAGENT	5	LB	1	YES
ACETIC ACID, GLACIAL	000679	64-19-7	REAGENT	400	ML	1	YES
ACETONE	001797	67-64-1	REAGENT	200	ML	1	YES

Attachment I

Sample of Microsoft Excel Spreadsheet

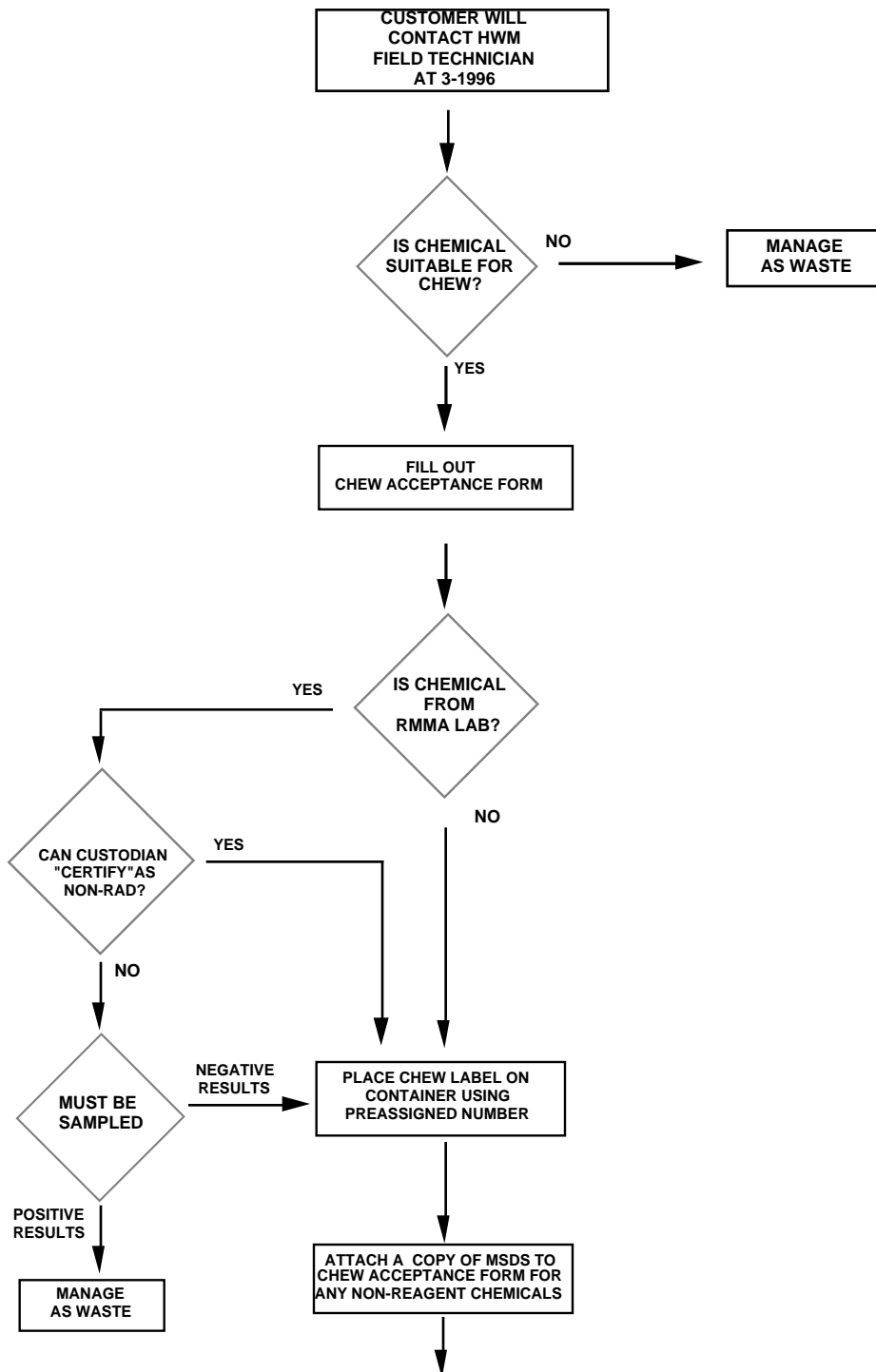
chew data in excel 3.0

3/1/94

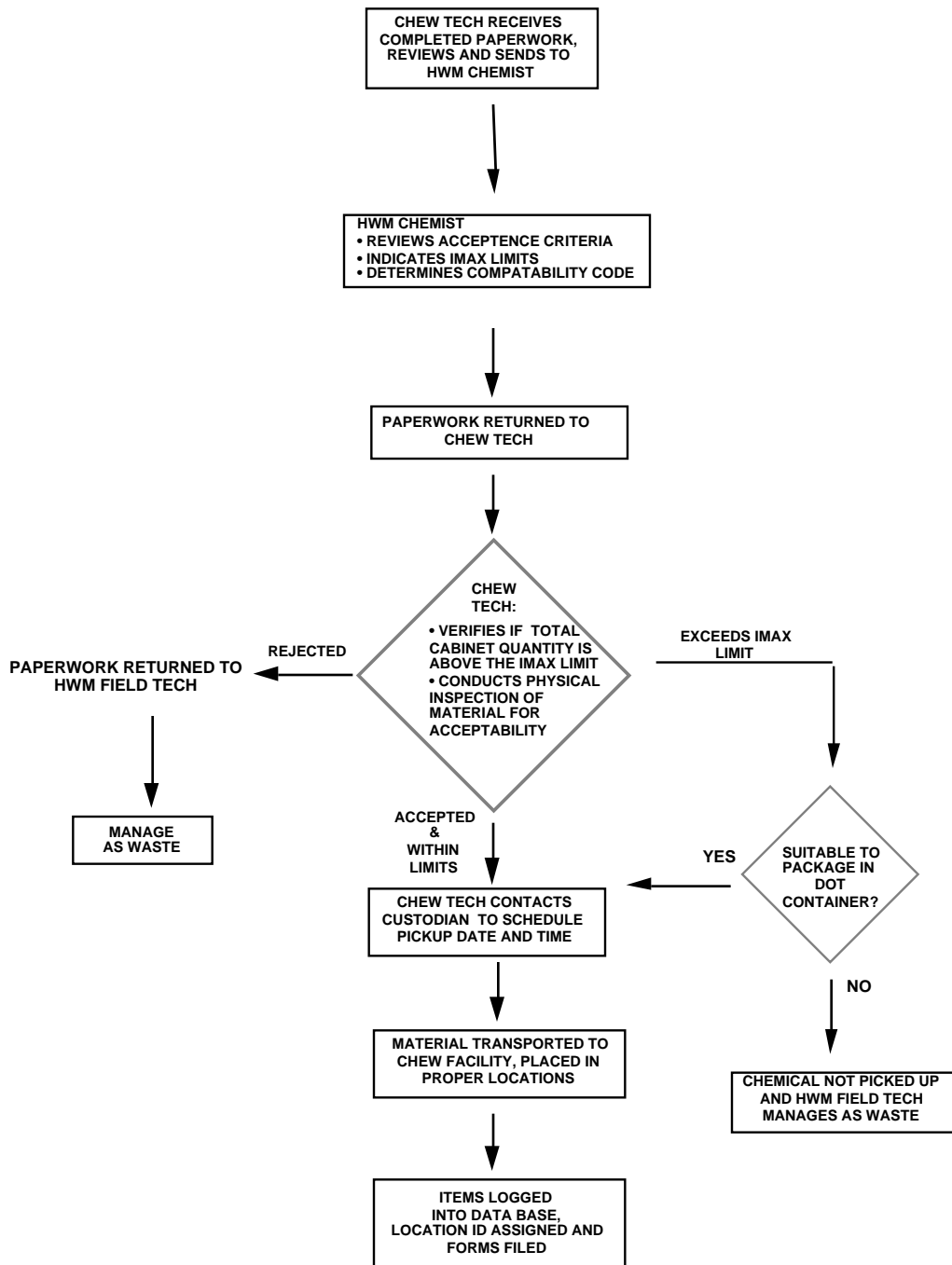
CHEW #	CHEMICAL NAME	CAS #	PURITY	EXPIR DATE	PHYSICAL STATE	CONTAIN TYPE	WT.	UNIT	CONT SIZE	TOTAL	OPENED	MANUFACTURER
001025	1-OCTADECANOL		REAGENT	NONE	SOLID	GLASS	1	KG	1KG	1	YES	ALDRICH
000133	1,10-PHENANTHROLINE	66-71-7	REAGENT	NONE	SOLID	GLASS	10	GM	10GM	1	NO	BAKER
001661	1,1,1-TRICHLOROETHANE		REAGENT	NONE	LIQUID	GLASS	0.75	GL	1GL	3	YES	MALLINCKRODT
000089	1-BUTANOL	71-36-3	REAGENT	NONE	LIQUID	GLASS	500	ML	500ML	2	1Y & 1N	BAKER
001025	1-OCTADECANOL		REAGENT	NONE	SOLID	GLASS	1	KG	1KG	1	YES	ALDRICH
000133	1,10-PHENANTHROLINE	66-71-7	REAGENT	NONE	SOLID	GLASS	250	GM	10GM	1	NO	BAKER
001661	1,1,1-TRICHLOROETHANE		REAGENT	NONE	LIQUID	GLASS	250	GL	1GL	3	YES	MALLINCKRODT
000185	1,2-NAPHTHOQUINONE-4-SULFONIC SODIUM SALT	521-24-4	REAGENT	NONE	GRANULAR	GLASS	250	GM	100GM	1	YES	EASTMAN KODAK
000107	1,3-DIPHENYL-1,3-PROPANEDIONE	120-46-7	TECHICAL	NONE	SOLID	GLASS	250	GM	25GM	1	YES	EASTMAN KODAK
000106	1,5-DIPHENYLCARBOHYRAZIDE	140-22-7	TECHICAL	NONE	SOLID	GLASS	250	GM	25GM	1	YES	EASTMAN
000105	2,7-DICHLOROFLUORESCIN	76054-0	TECHICAL	NONE	SOLID	GLASS	250	GM	25GM	1	YES	EASTMAN
000115	2-NAPHTHOL	135-19-3	PURE	NONE	CRYSTAL	GLASS	250	GM	100GM	1	YES	MATHESON COLEMAN AND BELL
000114	2,3-NAPHTHALENEDIAMINE	771-97-1	REAGENT	NONE	SOLID	GLASS	250	GM	1GM	1	YES	BAKER
001026	3,3-THIOPROPIONIC ACID		REAGENT	NONE	SOLID	GLASS	1	GM	500GM	1	NO	ALDRICH
000144	8-QUINOLINOL	148-24-3	REAGENT	NONE	SOLID	GLASS	250	LB	.25LB	1	NO	BAKER
000097	ACACIA (GUM ARABIC)		UNUSED	NONE	POWDER	GLASS	1	GM	500GM	1	NO	KODAK
000345	ACETIC ACID GLACIAL	64-19-7	UNKNOWN	NONE	LIQUID	GLASS	5	LB	3/4 GAL	1	NO	BAKER
NONE	ACETONE		REAGENT	NONE	LIQUID	METAL	4	GL	5GAL	1	YES	UNKNOWN
001552	ALUMINA ACTIVATED 28-40 MESH	1344-28-1	UNUSED	NONE	SOLID	GLASS	250	GM	750ML	1	YES	E.M. SCIEN
001041	ALUMINIUM OXIDE		REAGENT	NONE	SOLID	PLASTIC	1	LB	1LB	1	NO	ALLIED
001303	ALUMINIUM OXIDE ACTIVATED		>95%	NONE	POWDER	PLASTIC	100	GM	100GM	1	NO	ALFA
000325	ALUMINUM CHLORIDE ANHYDROUS		REAGENT	NONE	POWDER	GLASS	500	GM	500GM	1	YES	MALLINCKRODT
000554	ALUMINUM GRANULAR 150-325 MESH		99.50%	NONE	POWDER	METAL	5	LB	5LB	5	NO	CONSOLIDATED
000556	ALUMINUM METAL		PURIFIED	NONE	NEST POWD	METAL	1	LB	1LB	6	Y	FISHER SCIENTIFIC
000595	ALUMINUM METAL		UNUSED	NONE	GRANULAR	GLASS	1	LB	1LB	2	1Y & 1N	BAKER
000586	ALUMINUM METAL		REAGENT	NONE	POWDER	GLASS	1	LB	1LB	1	YES	ALLIED
000594	ALUMINUM METAL POWDER		UNUSED	NONE	POWDER	GLASS	1	LB	1LB	5	YES	BAKER
000530	ALUMINUM NITRATE		99.10%	NONE	POWDER	GLASS	500	GM	500GM	6	NO	FISHER
000156	ALUMINUM OXIDE	1344-28-1	REAGENT	NONE	SOLID	GLASS	250	LB	1LB	1	YES	ALLIED CHEM
001549	ALUMINUM OXIDE	1344-28-1	REAGENT	NONE	SOLID	PLASTIC	250	GM	500ML	3	NO	BAKER

Attachment J

Flow into CHEW Inventory

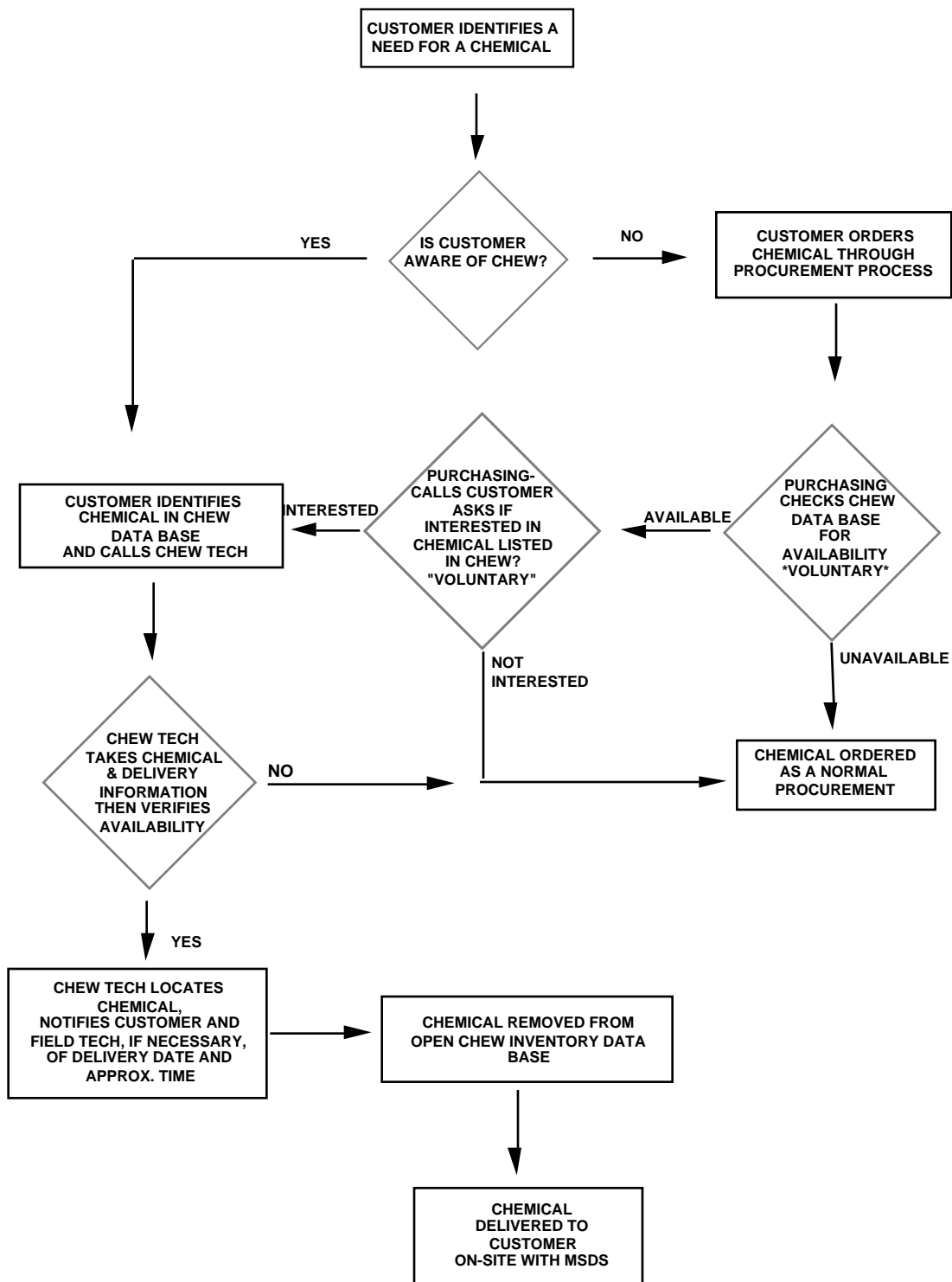


Attachment J (Continued)



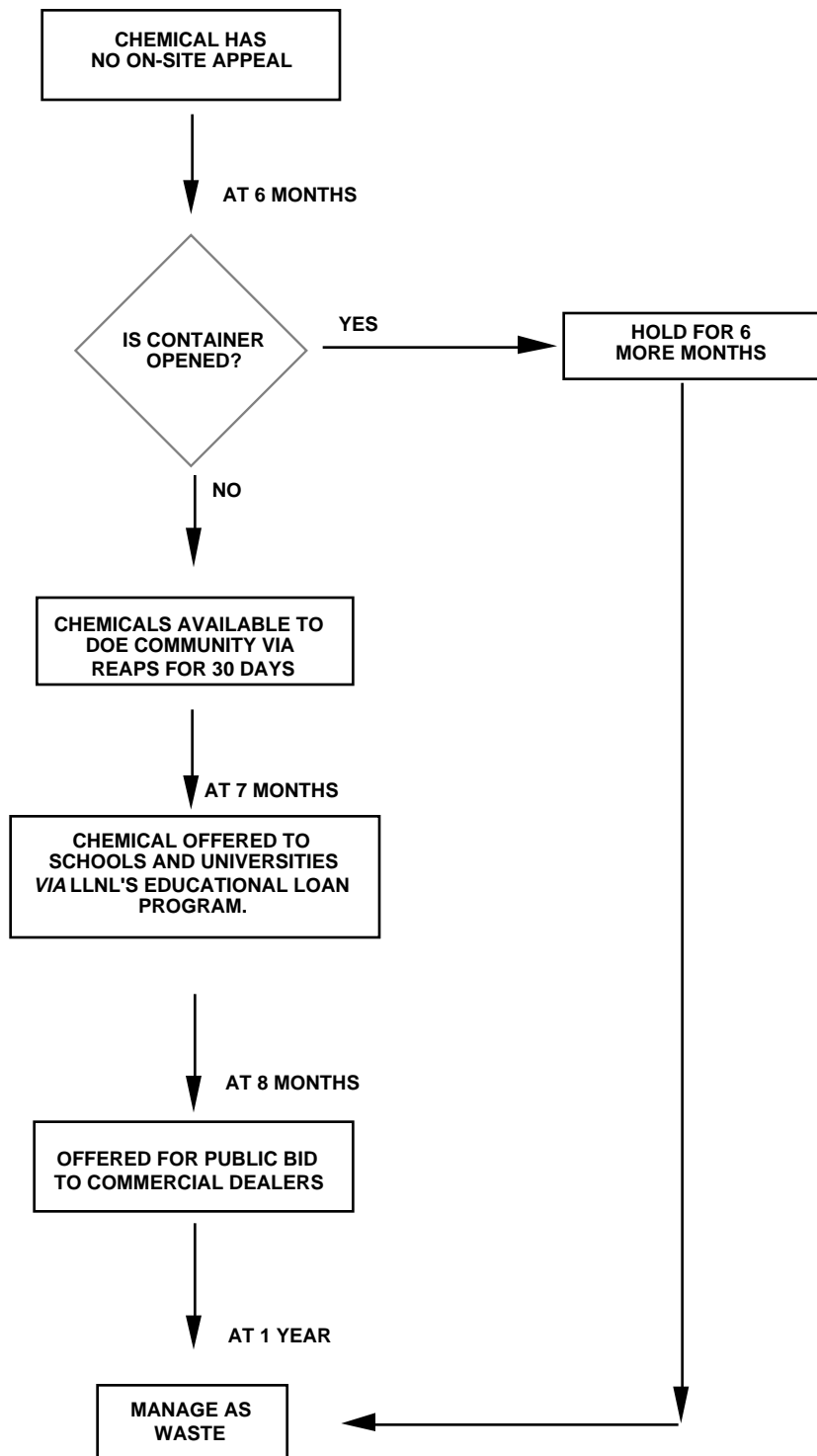
Attachment K

Flow Out of CHEW Inventory to NEW LLNL USER

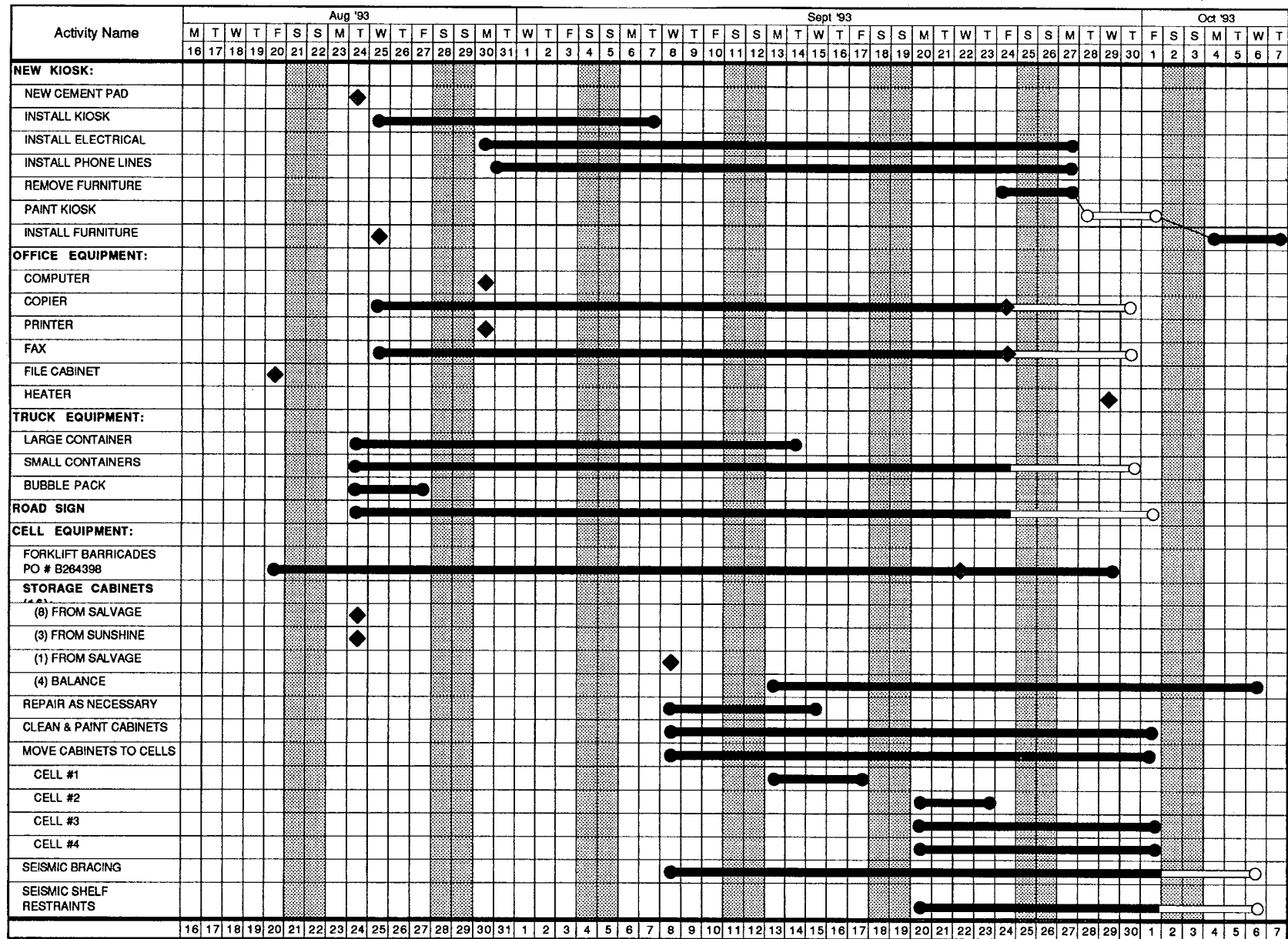


Attachment L

Flow out of CHEW Inventroy to Off-site Destination



Startup Schedule for Facilities and Equipment



[illegible]

Reprint of an article from

TUESDAY'S *Newsline*

Published twice weekly for employees of Lawrence Livermore National Laboratory

Tuesday, December 14, 1993 Vol 18, No. 92

CHEW aims to take bite out of chemical costs

The people at the Lab's new Chemical Exchange Warehouse (CHEW) hope to take a big bite out of Lab waste disposal by putting some of the material into the hands of people who can use it.

Operated by the Environmental Protection Department's Hazardous Waste Management Division, CHEW aims to reduce the amount of unwanted and surplus Lab chemicals sent off-site for disposal. The warehouse collects and stores those chemicals instead, then offers them to new users either at the Lab or offsite.

"With thousands of containers of chemicals regularly in use at the Lab, leftover chemicals have amounted to a sizable portion of the waste sent to Hazardous Waste Management for disposal," said Linda Souza, CHEW project manager. "We developed the CHEW program to try to keep some of that out of the waste cycle and in the hands of users."

Not only will the program reduce waste disposal, Souza said, it will also save on waste

handling, transportation, and disposal costs, as well as the cost of buying new chemicals.

CHEW improves upon an idea developed earlier by the Defense Sciences and Lasers Programs. Their computerized Chemical Exchange Database serves as an electronic chemical exchange. It does not, however, provide a place to store excess chemicals, nor offer surplus stock to off-site users. The Chemical Exchange Database will stay on-line at least until the end of the year, said Souza, after which it is expected that CHEW will handle all exchanges.

Placed in operation about a month ago, the Chemical Exchange Warehouse has already collected more than 500 chemical containers — from 50-gram bottles to 55-gallon drums. The program has found new users for materials ranging from hydrogen peroxide to nitric acid.

Those wishing to dispose of unneeded chemicals can call CHEW directly at 423-1996 or pager 01158. Potential contrib-

utors can also contact the HWM Division Field Technician in their program area to ask about having the chemicals moved to the warehouse.

CHEW personnel will verify a donated chemical's composition and, if acceptable for reuse, list the chemical on the Lab's AppleTalk Macintosh computer network. After receiving a request for a material in stock, CHEW will deliver the chemicals for free. The Lab's Contracting and Materiel Management Department (formerly Procurement) will search the CHEW database whenever it receives a chemical requisition, and redirect the requester if the chemical is available at the Warehouse.

Lab users will have first preference for the chemicals in CHEW. After six months, they will be offered to DOE customers, then to schools and universities. If there are no takers after 11 months, the chemicals will be disposed of as hazardous waste.

Attachment O

WASTE MATTERS

HWM

A BULLETIN OF THE HAZARDOUS WASTE MANAGEMENT DIVISION

VOLUME II, NO. 5 NOVEMBER 1993

CHEMICAL EXCHANGE WAREHOUSE PROJECT

Linda Souza, HWM Waste Operations

HWM implemented the Chemical Exchange Warehouse (CHEW) project the first week in October. The CHEW project upgrades the existing Chemical Exchange database developed by Marge Gonzales and Mike DiMicco. This project is designed to identify and temporarily store excess, usable chemicals in Building 693 until requested by someone who will use them productively.

Instead of buying new chemicals from a commercial supplier or manufacturer, a user can obtain excess chemicals free-of-charge from CHEW.

When programs shut down, employees retire, or inventories are reduced, many usable chemicals are sent to HWM for disposal. Unused chemicals represent a substantial portion of HWM's waste; managing these still usable materials as hazardous waste is expensive.

CHEW promotes waste minimization and results in considerable savings by reducing the amount of new chemicals that need to be purchased as well as reducing costs of hazardous materials disposal.

The categories of materials expected to be stored within CHEW include:

- New chemicals
- Opened/used chemicals in good, clean containers
- Paints and coatings
- Cleaning compounds
- Adhesives and resins
- Oils and solvents

Note: *All of the above must be in an original manufacturer's container in good condition*

Materials excluded from the exchange are such items as:

- Explosives and unsafe chemicals
- Outdated chemicals
- Products with no demand
- Products with poor or dirty packaging
- Products not certified to be rad free
- Inoperable spray cans
- Customized mixtures
- Solutions in dispensing/squeeze bottles

How Does CHEW Work?

A full-time HWM technician is assigned to CHEW. The chemicals will be stored initially in HWM's Building 693. Generators will be able to use the system by following the procedures specified below.

To send excess chemicals to CHEW:

- Contact the HWM field tech in your area
- The field tech will review your excess inventory against CHEW suitability criteria.
- Fill out a CHEW Acceptance Form and attach an MSDS
- The HWM field tech takes the CHEW Acceptance Form to the HWM review chemist and CHEW tech for approval.
- The CHEW tech moves chemicals into CHEW stock at B693.
- The CHEW tech enters the item into the database and files the MSDS.
- Each day the CHEW tech downloads database to Word and Excel programs.

To obtain excess chemicals from CHEW, follow this procedure on your Macintosh:

- Select "Chooser" from Apple Menu, select AppleShare.
- Select Zone — **EPD T6179**
- Select Server — **Operations (click OK)**
- Select Log On Method — **Use the Default Method, if asked (click OK)**
- Select status — **Guest (click OK)**
- Select by highlighting — **HWM_CHEW (click OK)**
- Close Chooser window.
- Server Icon named HWM_CHEW appears on desktop.
- Open the CHEW folder from within the server icon.
- Copy either the Word file and/or the Excel file to your local hard disk.
- Drag server icon into the trash.
- Browse the selected file for the desired chemical.
- Contact the CHEW tech (3-1996) for further information or to schedule delivery of the desired product.
- CHEW tech delivers item and updates the database.

For your next chemical purchase, why not check the CHEW database first?